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HUGHES AIRCRAFT COMPANY

FULLERTON, CALIFORNIA

FR 63-11-282
22 November 1963

BI-MONTHLY PROGRESS REPORT

ON

COLLECTIVE PROTECTION EQUIPMENT

FOR THE

AN/MSG-4 SYSTEM

PHASE II AND III

DEVELOPMENT, FABRICATION AND TEST

CONTRACT NO:

DA 18-108 CML-6618 (AMC 28A)

REPORT PERIOD:

Technical Report, 1 September to 31 October 1963
(10th Report)

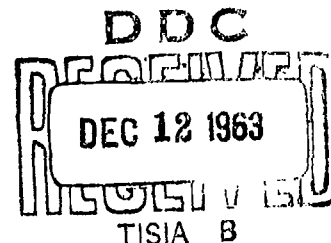
TO:

Commanding Officer
U. S. Army Chemical Research and
Development Laboratories
Edgewood Arsenal, Maryland

ATTENTION:

Contract Project Officer

PHASE II AND III



The Phase II Contract, executed September 1962, authorizes the continued development of Collective Protection Equipment and further provides for delivery of additional items of related equipment and the performance of services encompassing the activities of Maintenance Engineering, Value Engineering, and Data Submittal.

Phase III, executed by Contract Modification No. 7, 19 June 1963 authorizes:
(1) a feasibility study to evolve optimum designs of Collective Protection (CBR) Equipment for the Radar Tracking Station, OA-2952/65Q, the Missile Integration Terminal Equipment, AN/TSQ-(), and the Maintenance Shelter, AN/GSM-44, (2) modification of AN/MSG-4 Vehicles and Shelters to permit installation of Collective Protection Equipment for Engineering/Service Tests and (3) the fabrication of air leakage reduction kits.

GENERAL

During this reporting period, effort was devoted primarily to the following items of work:

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GENERAL (Continued)

1. Completion of the modification of four vehicles (during two field trips) at Fort Bliss, Texas, to accept Collective Protection Equipment.
2. Providing support during the AN/MSG-4 Engineering and Service Testing Program at the White Sands Missile Range, New Mexico.
3. Completion of nine Purchase Description drafts covering the Phase II Collective Protection System of each vehicle-shelter.
4. Completion and customer delivery of three Value Engineering Reports covering the basic Phase II items of major equipment.

CUSTOMER COORDINATION

1. Mr. Harry O. Huss, CRDL Staff, and Director of Value Engineering Programs for that agency, visited HAC on 18 September to explain CRDL expectations relative to Value Engineering Reports to be submitted by HAC in the immediate future. An extended Value Engineering Program was discussed briefly.
2. A HAC representative coordinated with CRDL representatives M. Mears, D. Stern, and N. Reich between 4 September and 13 September during installation and testing of Collective Protection Equipment on AN/MSG-4 Systems at Fort Bliss prior to the environmental testing at White Sands, New Mexico.
3. During AN/MPS-23 Radar Equipment Trailer modification at Fort Bliss, as well as AN/MSG-4 and CPE environmental testing at White Sands, New Mexico, from 7 October through 17 October, a HAC representative coordinated with the following personnel:
 - a. Captain R. W. Parker - Air Defense Board
 - b. M. Mears - U. S. Army Chemical Center
 - c. D. Stern - U. S. Army Chemical Center
 - d. A. Hayes - Ground Guidance Branch, EML, WSMR
 - e. L. Bugel - Test Labs, White Sands Missile Range
 - f. J. Barry - Dugway Proving Ground
 - g. W. Mussey - Mobility Command Liaison Office, WSMR

STUDY PROGRESS - Phase III

An analysis of existing RTS, MITE, and AN/GSM-44 shelters was completed with respect to mechanical aspects for application of Collective Protection Equipment. Effort was started on estimating air leakage rates, determining system power availability, calculating heating-cooling loads to verify capacity availability, and preliminary CPE installation design for the MITE and RTS shelters.

DESIGN PROGRESS

1. Phase II equipment design effort is complete. Development of Collective Protection Equipment for the AN/GSS-1D System remains suspended pending CRDL direction.

DRAWING PROGRESS

1. Phase II equipment drawing effort is complete, and all data submittals have been made. However, during field vehicle modifications several discrepancies arose, which will require correction of drawings. Records have been made of the necessary corrections and additions to the CPE drawings. It is anticipated that following Army Engineering/Service Testing, and evaluation of the Value Engineering Reports, a conference will be held to resolve the matter of updating drawings for production quantities of equipment.

FABRICATION PROGRESS

1. Field installations of CPE vehicle modifications were completed at Fort Bliss for the following vans:

<u>Vehicle/Shelter</u>	<u>Serial No.</u>	<u>Date Completed</u>
AN/MSQ-18 CDG	9	4 September
AN/MPS-23 RET	4	12 October
AN/MSQ-28 RDPC	4	4 September
AN/MSM-34 SMES	8	4 September

The AN/TSQ-38 OC Shelter, Serial No. 34, had been modified at HAC prior to shipment to Fort Bliss on 12 September.

2. All Phase II fabrication effort is complete except for the suspended AN/GSS-1D CB equipment.

TEST PROGRESS

1. Following modification of the five vehicles/shelters, air leakage checks were made by HAC and CRDL representatives. Air leakage testing of the Radar Equipment Trailer (RET) verified it to be the most critical of all vehicles/shelters of the AN/MSQ-4 System due to the very high internal pressures obtained when the air conditioner blowers were properly pressurized. However, CRDL testing showed a very low leakage rate for the RET of only 145 cfm, which is indicative of a good vehicle sealing job. The following field data illustrates pressures and air flow leakage rates of the vehicles after CPE modifications:

	<u>VEHICLE</u>				
	<u>Q-18</u> <u>CDG</u>	<u>MPS-23</u> <u>RET</u>	<u>Q-28</u> <u>RDPC</u>	<u>MSM-34</u> <u>SMES</u>	<u>Q-38</u> <u>OC</u>
Vehicle/Shelter-Air Conditioner System Air Leakage Rate (cfm)	68	145	154	100	133
Protective Entrance Air Scavenging Rate (cfm)	194	170	190	172	212
Air Conditioner Blower Inlet Pressure (inches water gage)	0.55	0.55	0.55	0.70	0.58

TEST PROGRESS (Continued)

	<u>VEHICLE</u>				
	<u>Q-18</u> <u>CDG</u>	<u>MPS-23</u> <u>RET</u>	<u>Q-28</u> <u>RDPC</u>	<u>MSM-34</u> <u>SMES</u>	<u>Q-38</u> <u>OC</u>
Personnel Compartment Pressure (inches water gage)	1.40	2.11	1.30	1.57	2.14
Protective Entrance Pressure, Inner Chamber (inches water gage)	1.10	1.80	0.96	1.33	1.88
Protective Entrance Pressure, Outer Chamber (inches water gage)	0.64	0.75	0.42	0.70	1.06

It will be noted that the Q-38 OC data reflects a high shelter internal pressure of 2.14 inches W.G. During Q-38 OC/CPE system tests at HAC an experimental orifice of 8.45 inches diameter, inserted in the shelter air delivery opening, reduced shelter internal pressure to 1.65 inches W.G. at an airflow rate of approximately 1,160 cfm, while maintaining adequate cooling of the electronic equipment. The shelter, when tested at Fort Bliss, was not equipped with the orifice. Its addition on a permanent basis is a desirable change and should be among those negotiated for production equipment.

2. The following observations were made by the HAC representative participating in the Engineering/Service Tests:
 - a. After a 100 mile "dirt road" test at Fort Bliss, inspection of the 400 cfm Filter Units revealed no damage, and air leakage verification tests of the vans indicated practically no change.
 - b. In general, AN/MSG-4 and CPE environmental testing at White Sands, New Mexico was successful, except for operation at ambient temperatures just below 0°F. At these conditions the refrigeration equipment of the Q-28 air conditioners automatically is prevented from operating. Because of internal van heat loads, temperature of the electronic equipment gradually rises to a dangerous level. Hence, an apparent incompatibility exists between the Q-28 air conditioners and Collective Protection Equipment when outside temperatures are near 0°F.
 - c. Results from other AN/MSG-4 and CPE environmental tests at White Sands, New Mexico were as follows: (1) When the Protective Entrances were deflated, considerable rain leakage occurred through stitching, zippers, and door coupling seals. However, inflated Protective Entrances allowed only minor moisture penetration. (2) Approximately 7½ pounds of dust particles were collected by the particulate filter of the spare 400 cfm Filter Unit, Serial Number P1 during dust tests. (3) Satisfactory operation of both blower and automatic damper motors was obtained from a 400 cfm Filter Unit during a -65°F cold start-up test. (4) Throughout the high temperature testing at ambients of 108°F with solar heat loading, all cooling air to the electronic equipment held very satisfactorily at levels less than +70°F supply temperature.

TEST PROGRESS (Continued)

- d. High altitude tests at Alamo Peak, New Mexico (elevation 9,000 feet) on the AN/MSQ-18 CDG showed that satisfactory pressures were held in all portions of the CPE System with adequate reserve filter capacity.
- e. Dugway Proving Ground personnel completed bacteriological dissemination tests on the Radar Data Processing Center (RDPC), Serial No. 4, at a desert location near the border of the Fort Bliss and WSMR reservations. Results of the testing disclosed that the Collective Protection Equipment appeared to have functioned very well by providing satisfactory protection to vehicle interior areas against heavily concentrated bacteriological attacks. These attacks were described by DPG personnel as much heavier than could be expected in actual warfare. Contamination which appeared inside the RDPC was completely attributed to errors in entry and exit procedures on the part of testing personnel.

EQUIPMENT DELIVERIES

During this reporting period the following equipment was delivered to Fort Bliss, Texas:

1. One (1) Protective Entrance (long) for the AN/TSQ-38 shelters.
2. One (1) Filter Unit, Serial No. 1 (Reworked with motor and overload corrections).

The following equipment was shipped to CRDL:

1. One (1) Protective Entrance (long) for the AN/GSS-1D shelters.
2. One (1) Blower and motor, reworked with new bearings.

DATA AND DRAWINGS

The following Purchase Description drafts were completed:

1. Collective Protection Equipment, AN/MSQ-28, Weapons Monitoring Center or Radar Data Processing Center, E-_____.
2. Collective Protection Equipment, AN/MSQ-28 Radar Equipment Trailer, AN/MPS-23, E-_____.
3. Collective Protection Equipment, AN/MSQ-28 Maintenance Trailer, AN/MSM-34, E-_____.
4. Collective Protection Equipment, AN/MSQ-28 Maintenance Trailer, AN/MSM-55, E-_____.
5. Collective Protection Equipment, AN/MSQ-28 Radar Antenna Trailer, AN/MPS-23, E-_____.

DATA AND DRAWINGS (Continued)

6. Collective Protection Equipment, AN/MSQ-18 Operations Central, E-_____.
7. Collective Protection Equipment, AN/MSQ-18 Coder-Decoder Group, E-_____.
8. Collective Protection Equipment, AN/TSQ-38 Operations Central, E-_____.
9. Collective Protection Equipment, AN/TSQ-38 Coder-Decoder Group, E-_____.

The following drawings and data were submitted to CRDL:

Vehicle Modifications	17 September 1963
CPE Installation Kits	17 September 1963
CPE Systems	20 September 1963

Value Engineering Reports were submitted on the following items:

Control Box	6 September 1963
Filter Unit	20 September 1963
Protective Entrances	11 October 1963

MAINTENANCE ENGINEERING

Maintenance package MP499-12 (Contract Item 7) has been completed to include "Comments", ECP-2 Changes and two additional requirements for Service Test. On 17 September 1963 forty (40) copies of the revised manual were shipped to CRDL, and on 11 September 1963 ten (10) copies were sent to the Air Defense Board at Fort Bliss.

VALUE ENGINEERING

Value Study Reports on the Control Box, Filter Unit, and the Protective Entrances have been completed and submitted to the Customer. These completed reports demonstrate substantial savings potential in future production. For example, if the recommended design changes are implemented in the Control Box and Filter Unit, the following cost reductions are possible on the total cost during production of 300 units each.

Control Box	\$ 18,090
Filter Unit	\$311,736

In the case of the Protective Entrances Value Study Report, a number of proposals were considered but evaluation proved them to be non-productive from a potential cost savings viewpoint on a large quantity basis.

ELECTRONIC COMPONENT DEVELOPMENT

No electronic components were developed during this reporting period.

FINANCIAL SUMMARY

The funds expended, manhours expended, estimated costs for the next reporting period, and the balance of contract funds are shown in the following chart. Dollars shown exclude fee.

September & October 1963		Cumulative Costs Through October		Estimated for November & December	
Man Hours	Total \$ Including Material	Man Hours	Total \$ Including Material	Man Hours	Total \$ Including Material
4,620	\$88,483.00	82,106	\$997,400.00	1,440	\$24,000.00

Contract Cost Funds	\$1,105,008.00
Less Cumulative Costs	<u>997,400.00</u>
Balance Remaining	107,608.00

PLANNED ACTIVITY FOR NEXT REPORTING PERIOD

1. Delivery of all Purchase Descriptions.
2. Completion and delivery of Final Value Engineering Report.
3. Change and re-submit CPE System top drawings to delete direct call-out of Vehicle Modification Kits.
4. Completion of the CPE feasibility study for the Radar Tracking Station, the Missile Integration System, and the AN/GSM-44 Maintenance Shelter.
5. Negotiation, with CRDL, of all necessary modifications to Collective Protection Equipment delivered during the Phase II Program.

HUGHES AIRCRAFT COMPANY
Ground Systems Group

L. W. Maples
L. W. Maples
Project Head

Attachments